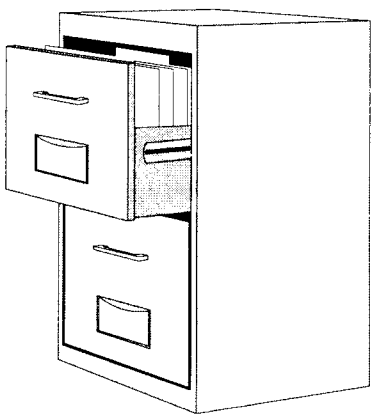
APPENDIX A

FINAL EXAM



ENGINEERING PRINCIPLES AND PRACTICES OF RETROFITTING FLOOD-PRONE RESIDENTIAL STRUCTURES INDEPENDENT STUDY

FINAL EXAMINATION

This exam is intended to test your mastery of the Engineering Principles and Practices of Retrofitting Flood-Prone Residential Structures Independent Study Course objectives. Using a soft lead (#2) pencil, record the best answer for each of the following questions on the enclosed answer sheet. There is only one correct answer for each question. When you have finished, prepare the answer sheet as directed and mail to the address provided. Your examination will be evaluated and the results returned to you as quickly as possible.

1. Retrofitting a residential structure to withstand floodwater-generated forces

   a. results in a structure that is better able to withstand non-flood-related forces.

   b. may result in a structure that is better able to withstand non-flood related forces if a multi-hazard design approach is taken.

   c. may result in a structure that is less able to withstand non-flood-related forces.

   d. b & c

2. When elevation is selected as the appropriate retrofitting measure

   a. structures should be raised so that the lowest floor is at or above the flood protection elevation.

   b. existing footings are always sufficient to carry expected loads.

   c. one foot of freeboard is included as a factor of safety.

   d. a & c

3. When elevating on vertically extended perimeter walls, it is critical that

   a. perimeter walls form a solid enclosure and do not allow floodwaters to enter the structure.

   b. perimeter walls be constructed with openings to allow hydrostatic forces to equalize.

4. Dry floodproofing

   a. involves the use of waterproofing compounds, sheeting, or sheathing that do not deteriorate when exposed to floodwaters and sealant systems that are not subject to puncture when exposed to water, ice, and debris flow of significant velocity.

   b. involves sealing the portion of a structure that is below the flood protection level to make the structure watertight.

   c. satisfies the NFIP requirement for bringing substantially damaged or improved residential structures into compliance.

   d. a & b

5. Modifying a structure to allow floodwaters to enter a structure in a way that minimizes damage to the structure and its contents, known as wet floodproofing, involves

   a. permanent relocation of damageable items.

   b. temporary relocation of damageable items.

   c. great cost.

   d. the use of flood-damage-resistant building materials.

   e. a, b & d

6. Floodwalls

   a. are compacted earthern structures.

   b. satisfy the NFIP requirement for bringing substantially damaged or improved structures into compliance.

   c. are engineered barriers typically constructed of reinforced concrete or masonry.

   d. require considerable land area.

7. One of the goals of the National Flood Insurance Act of 1968 is to guide future development away from flood hazard areas. Additional goals of this Act include

   a. requiring that new and substantially improved buildings be constructed to resist flood damage.

   b. transferring some of the financial burden of flood losses from flood victims to other taxpayers through luxury taxes.

   c. transferring some of the costs of flood losses from taxpayers to floodplain property owners.

   d. a & c

8. Which of the following statements are true for riverine floodplains?

   a. The floodway fringe is the area around a floodplain that states and communities cannot legally regulate.

   b. As long as the cumulative effect of encroachment does not increase by more than two inches every five years, the 100-year flood elevation can be increased by up to three feet.

   c. A floodway is the channel of a watercourse as well as any adjacent floodplain areas that convey flood flows and must be kept free of encroachment to avoid increases in flood depths.

9. A Zones are

   a. Special Flood Hazard Areas (SFHAs) not subject to coastal high hazard flooding.

   b. areas that appear on newer FIRMs and incorporate areas previously shown as B and C Zones.

10. Substantial damage is flood damage sustained by a structure whereby the cost of restoring the structure in accordance with post-FIRM regulations would equal or exceed 50 percent of the structure's value before the damage occurred.

    a. True

    b. False

11. For floodplain management purposes, a post-FIRM building is a building for which the start of construction postdates the effective date of the community's NFIP-compliant floodplain management ordinance.

    a. True

    b. False

12. Of those listed below, who is responsible for developing floodplain management regulations concerning the use of floodplain land?

    a. Model building code groups

    b. Local government

    c. Federal government

    d. b & c

    e. a & c

13. Identify the model building code that is most commonly used for residential structures.

    a. Uniform Building Code

    b. Standard Building Code

    c. One- and Two-Family Dwelling Code

    d. BOCA National Building Code

    e. All of the above

14. The homeowner provides information on the following factors:

    a. financial, accessibility, aesthetic, and permitability.

    b. financial, accessibility, aesthetic, and risk.

    c. financial, design criteria, code upgrades, and risk.

15. In situations of high flood velocity, what are the forces that cause a building to be moved from its foundation?

    a. Impact, drag, suction

    b. Impact, drag, suction, hydrostatic

    c. Hydrostatic and hydrodynamic

16. Flood velocity may be determined from

    a. historical data, comparisons with similar basins, a detailed hydrograph.

    b. historical data.

    c. historical data, an evaluation of drainage conditions, Flood Insurance Studies.

17. The recommended retrofitting option for a structure located in a floodway is

    a. elevation.

    b. wet floodproofing.

    c. dry and wet floodproofing.

    d. relocation.

18. If a levee is built near a house with a basement in order to protect it from floodwaters, and the soil at the house is highly permeable,

    a. a sump pump should be installed to lower the phreatic surface.

    b. an impermeable subsurface cut-off beneath the levee should be constructed.

    c. the distance between the house and the levee should be increased.

    d. Any of the above

19. The substructure of a building

    a. helps maintain a human comfort zone.

    b. includes the vertical foundation elements.

    c. includes the sanitary and drainage systems.

20. High velocity floodwaters in the upper part of an alluvial fan necessitate elevation as retrofitting measure.

    a. True

    b. False